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MIL-STD-2045-14500-1
16 March 1994

MILITARY STANDARD

Information Technology
DOD Standardized Transport Profile

TA21(D) COTS OVER CLNS

Part 1: Transport and Network Layers

AMSC: N/A

AREA: DCPS

Foreword

This military standard is approved for use by all Departments and Agencies of the Department of Defense (DOD).

Beneficial comments (recommendations, additions, deletions) and any pertinent data that may be of use in improving this MIL-STD should be addressed to the:

Joint Interoperability and Engineering Organization (JIEO)
ATTN: TBBF
Fort Monmouth, New Jersey 07703-5613

by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this MIL-STD or by memorandum.

This DOD Standardized Profile (DSP) is a functional DOD Data Communications Protocol Standard (DCPS) produced by the DCPS Technical Management Panel (DTMP) Working Group 1 on Lower Layers. The MIL-STD-2045 document series was established within the DCPS Standardization Area to allow for the enhancement of commercial standards or the development of standards that are unique to DOD. DTMP functional standards are functional groupings of base standards. Referenced base standards may be commercial, DOD or de facto standards, although International Standards (produced by the International Standards Organization (ISO), the Inter-Telecommunication Union (ITU) (formerly known as the Consultative Committee for International Telephone & Telegraph (CCITT)), and other bodies) are preferred when possible.

The MIL-STD-2045-10000 series, MIL-STD-2045-10000 to MIL-STD-2045-19999 inclusive, will be used to describe how DOD will implement commercial, international, national, federal, or military standards within the functional profile concept to provide required network services. The Government Open Systems Interconnection Profiles (GOSIP) will serve as the base for developing the 10000 series, with DOD enhancements, unique military standards, and interim standards being used only when necessary.

The MIL-STD-2045-20000 series, MIL-STD-2045-20000 to MIL-STD-2045-29999 inclusive, will be used to describe DOD enhancements and extensions to existing commercial, international, national, or federal standards.

The MIL-STD-2045-30000 series, MIL-STD-2045-30000 to MIL-STD-2045-39999 inclusive, will be used to describe protocols and services unique to DOD that will not be supported by commercial, international, national, or federal standards.

The MIL-STD-2045-40000 series, MIL-STD-2045-40000 to MIL-STD-2045-49999 inclusive, will be used to document interim standards. Interim standards document protocols and services needed by DOD until these protocols and services are described in either a GOSIP or a MIL-STD-2045-20000 or -30000 series standard.

Specific details and instructions for establishing a MIL-STD-2045 document, as well as profile development guidelines, are documented in MIL-HDBK-829. DTMP Working Groups shall be responsible for DSP development and informal Service or Agency coordination; the DTMP Plenary shall be responsible for final review and approval.

This document was produced as an outgrowth of a requirement established for transmitting digital imagery and imagery-related products using the National Imagery Transmission Format Standard (NITFS) and is intended to be a generic transport profile for end systems (ES) to communicate over DOD or commercial circuits.

This document is part of a set of DOD data communications protocol profiles and is intended to support the interoperability of DOD communication networks, ultimately including connectivity with the Defense Data Network (DDN).

The current technical content of this document has been derived wherever possible from ISO/IEC DIS 8072 and ISO/IEC DIS 8473. However, this document is based on DOD requirements; and differences between the content of this document and these base standards may exist. This document must be combined with ISO/IEC DIS 8072 and ISO/IEC DIS 8473.

This part of MIL-STD-2045-14500 contains one normative annex and one informative annex:

Annex A (normative)	DSPICS REQUIREMENTS LIST (DPRL)
Annex B (informative)	CONCLUDING MATERIAL

For DOD acquisition purposes, where such differences exist, this DSP shall be the controlling document.

The Preparing Activity for this standard is the DTMP. The custodians for the document are identified in the Defense Standardization Program, "Standardization Directory (SD-1)," and are classified in the Federal Supply Classification (FSC) system under Data Communications Protocol Standards (DCPS). Additional information can be obtained from:

Joint Interoperability and Engineering Organization (JIEO)
ATTN: DTMP Chairman
Fort Monmouth, New Jersey 07703-5613

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Introduction

This DOD Standardized Profile (DSP) is defined within the context of functional standardization, in accordance with the principles specified by ISO/IEC TR 10000, "Framework and Taxonomy of International Standardized Profiles," and MIL-HDBK-829. The context of functional standardization is one part of the overall field of Information Technology (IT) standardization activities - covering base standards, profiles, and registration mechanisms. A profile defines a combination of base standards that perform a specific well-defined IT function. Profiles standardize the use of options and other variations in the base standards to promote system interoperability and to provide a basis for the development of uniform, internationally recognized system tests.

One of the most important roles for a DSP is to serve as the basis for the development of recognized tests. DSPs also guide implementors in developing systems that fit the needs of the US Department of Defense (DOD). DSPs are produced not simply to `legitimize' a particular choice of base standards and options, but to promote real system interoperability. The development and widespread acceptance of tests based on this and other DSPs are crucial to the successful realization of this goal.

The base standards of this DSP are the Open Systems Interconnection (OSI) Reference Model for OSI Layer standards. The Layer standards are composed of the ISO, ITU, other international civil standards, or Federal Information Processing Standards (FIPS).

This document is intended to be part of a complete transport profile. It specifies a connection-mode transport service over a connectionless mode network service operating over a subnetwork dependent service that provides a synchronous, asynchronous, half-duplex or full-duplex dedicated digital circuit. This transport profile is a multipart profile, of which this is Part 1. Part 1 identifies the subnetwork independent requirements for Transport profile Group TA that specifies the connection-mode transport protocol over the connectionless network services independent from the subnetwork environment.

This DSP is intended to be GOSIP-compliant. Since GOSIP permits differing subnetwork technologies, the excursions from those subnetworks described in FIPS 146-1, or use of standards that are clearly an update in the series, are of no real consequence to GOSIP internetworking capabilities and only affect the particular subnetwork being employed. The internetworking and end system-to-end system (ES-ES) aspects are fully compliant.

Selections of options are a decision and choice left solely to the implementor based on operational necessity. Vendors shall implement the options chosen by the implementor.

This part of MIL-STD-2045-14500 contains one normative annex and one informative annex:

Annex A DSPICS Requirements List (DPRL) (Normative)
Annex B Concluding Material (Informative)

Information Technology Standards - DOD Standardized Profile TA21(D) - Reliable End-System Transport for DOD Communications Part 1: Network and Transport Layers

1 Scope

1.1 General

This part of MIL-STD-2045-14500 applies to end systems (ES) concerned with operating in the military Open Systems Environment (OSE). It specifies a combination of layer protocols that collectively provide the connection-oriented Transport Service using the connectionless-mode Network Service operating over a subnetwork using a synchronous, asynchronous, full-duplex or half-duplex dedicated link.

1.2 Position Within the Taxonomy

This profile is classified as MIL-STD-2045-14500 in accordance with MIL-HDBK-829. This classification is equivalent to the DSP-TA21(D) in accordance with MIL-HDBK-829 and ISO TR 10000.

1.3 Scenario

This part of MIL-STD-2045-14500 specifies the provision of the OSI connection-mode Transport Service between an ES connected to a subnetwork or another compatible remote ES through the OSI connectionless-mode Network Service. The compatible ES must use the same subnetwork access method specified in this profile and may conform to an alternative DSP with the same lower layer options selected. An ES is only compatible if the sub-options (e.g., Transport Protocol (Class 4)) are compatible. This DSP provides the subnetwork independent requirements and the subnetwork access requirements for group TA transport profiles. Figure 1 depicts a scenario of two ES connected using a direct dedicated link (TA21 in this case). Figure 2 shows an enterprise of ES (TA21 ES) intra-networking and inter-networking with CLNP.

Figure 1 - Direct Point-to-Point Connection

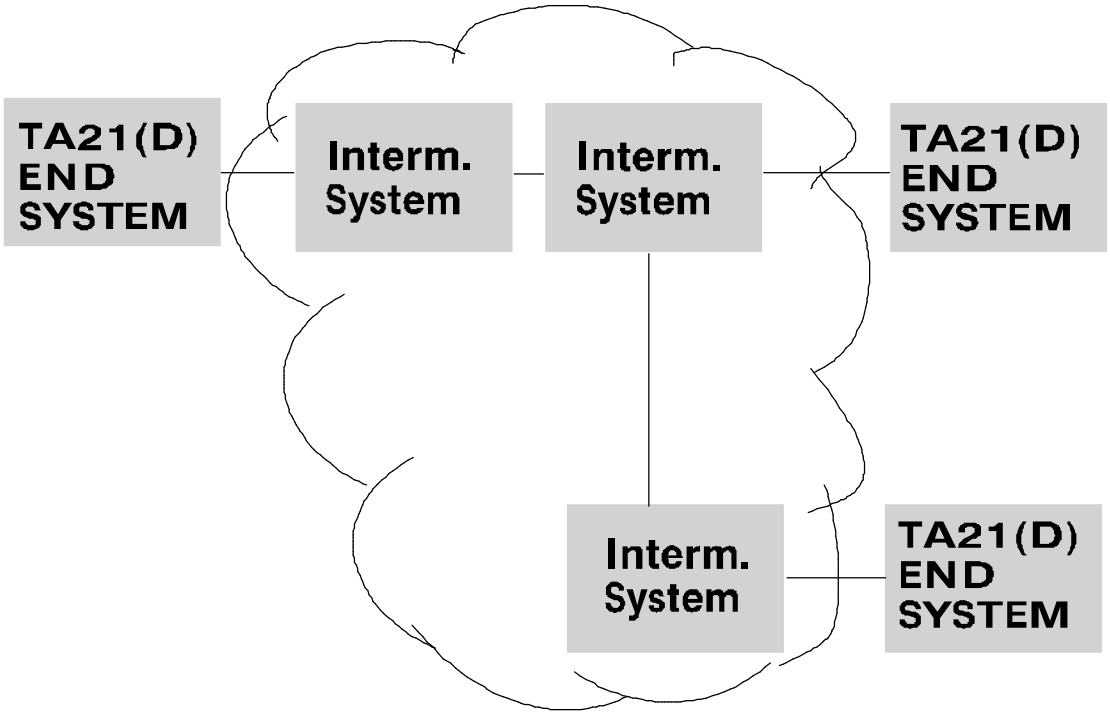

Figure 2 - Internetworking with CLNP

The ISO layer standards that make up this profile are shown in Table 1.

ISO LAYER	BASE STANDARDS	TAXONOMY	
		ISO	DOD
TRANSPORT LAYER	ISO 8073	TA21	MIL-STD-2045-14500-1
NETWORK LAYER	ISO 8473		
DATA LINK LAYER	As defined in parts 2 - (n)	Subnetwork Access (variable)	MIL-STD-2045-14500-2 - (n)
PHYSICAL LAYER	As defined in parts 2 - (n)		

Table 1 - Protocol Stack for MIL-STD-2045-14500-1

The requirements placed on an ES in the DSP are only those necessary to operate the specified set of protocols. The DSP does not specify the required functions for relays or the required function for operations in unreliable modes such as the simplex mode which is out of scope. The End System-to-Intermediate System (ES-IS) protocol may be invoked when internetworking; however, this protocol is out of scope. The physical layer standards are recommended, not mandated.

2 References

The following documents contain specific provisions which, through reference and selection in this text, constitute the required operational conditions for this DSP. At the time of publication, the editions indicated were valid. All documents are subject to revision, and parties to agreements based on this DSP are warned against automatically applying any more recent editions of the documents listed below, since the references made by DSPs to such documents may be specific to a particular edition. The standards referenced by a base standard apply to the DSP only to the extent that they apply to that base standard and to the extent that the DSP allows.

2.1 Government Documents

2.1.1 Specifications, Standards, and Handbooks

The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation.

Federal Information Processing Standards (FIPS):

FIPS 146-1:1991: *Government Open Systems Interconnection Profile (GOSIP), Version 2.*

Military Handbooks (MIL-HDBKs):

MIL-HDBK-829: *Guidelines for Developing Data Communications Protocol Standards (MIL-STD 2045 Series Documentation).*

DOD activities may obtain copies of DOD directives through their own publications channels or from the DOD Single Stock Point, Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094. Other federal agencies and the public may purchase copies from the U.S. Department of Commerce, National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161-2171. Copies of FIPS are available to DOD activities from the Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120-5099. Others must request copies of FIPS from the U.S. Department of Commerce, National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161-2171.

2.1.2 Other Government Documents, Drawings, and Publications

The following other government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

NIST SP-500-206: *Stable Implementation Agreements for Open Systems Interconnection Protocols Version 6 Edition 1.*

2.2 Non-Government Documents

The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD-adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation.

2.2.1 Profiles

ISP 10608-1: *Information Technology - International Standardized Profile TAnnnn - Connection-mode Transport Service over Connectionless-mode Network Service. 1992-04-30 Part 1: General Overview and Subnetwork-type Independent Requirements.*

(Application for copies of these documents should be addressed to the American Standards Institute, 11 West 42nd Street, New York, NY 10036 or to ISO, Van Demonstrate 94, 1013 CN Amsterdam, Netherlands.)

2.2.2 Base Standards

ISO DIS 8073:1991: *Information Technology - Telecommunications and Information Exchange Between Systems - Connection Oriented Transport Protocol Specification (2nd edition).*

ISO 8473:1988: *Information Processing Systems - Data Communications - Protocol for Providing the Connectionless-mode Network Service.*

ISO 8473:1988/Add.3:1989: *Information Processing Systems - Data Communications - Protocol for Providing the Connectionless-mode Network Service. Addendum 3: Provision of the Underlying Service Assumed by ISO 8473 over Subnetworks that Provide the OSI Data Link Service.*

ISO 8473:1988/PDAM4:1991: *Information Processing Systems - Data Communications - Protocol for Providing the Connectionless-mode Network Service - Amendment 4: PICS Proforma and Conformance clause.*

ISO 8473:1988/Technical Corrigendum: *Information Processing Systems - Data Communications - Protocol for Technical Corrigendum Providing the Connectionless-mode Network Service. Technical 1:1992 (Draft) Corrigendum 1: Resolving Defect Reports 001 through 011.*

ISO 8473-1:1993: *Information Technology - DIS Proposed Second Edition of ISO/IEC 8473 (Part 1) - Protocol for Providing the Connectionless-Mode Network Service - Part 1: Protocol Specification.*

2.2.3 Other Non-Government Documents, Drawings, and Publications

The following other non-government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

ISO 7498:1984: *Information Processing Systems - Open Systems Interconnection - Basic Reference Model.*

ISO TR 10000: *Information Technology - Framework and Taxonomy of International Standardized Profiles.*

ISO 9542:1988: *Information Processing Systems - Telecommunications and Information exchange between systems - End system to Intermediate System Routing Exchange Protocol for use in conjunction with the Protocol for providing the Connectionless Mode Network Service.*

ISO 8072:1986: *Information Processing Systems - Open Systems Interconnection - Transport Service Definition.*

ISO 8348:1992-7: *Information Processing Systems - Data Communications - Network Service Definition.*

ISO TR 9575: *Information Technology - Telecommunications and Information Exchange Between Systems - OSI Routing Framework.*

ISO 8473/PDAD2:1988-4: *Information Processing Systems - Data Communications - Protocol for Providing the Connectionless-mode Network Service. Addendum 2: Formal Description of ISO 8473.*

ISO 8473/PDAM6:1992-7: *Information Processing Systems - Data Communications - Protocol for Providing the Connectionless-mode Network Service. Amendment 6: Addition of an Echo Function to ISO 8473.*

(Application for copies of these documents should be addressed to the American Standards Institute, 11 West 42nd Street, New York, NY 10036 or to ISO, Van Demonstrate 94, 1013 CN Amsterdam, Netherlands.)

3 Definitions

For the purposes of this DSP, the following terms have the meanings stated in DSP Guidelines:

Base Standard

DOD Protocol Implementation Conformance Statement (DPICS)
DOD Standardized Profile (DSP)
DOD Standardized Profile Implementation Conformance Statement (DSPICS)
DSPICS Requirements List (DPRL)

4 Abbreviations and Acronyms

The symbols and abbreviations used in this DSP are defined in MIL-HDBK-829, in the referenced base standards, or in the standards referenced by the base standards.

ABM	Asynchronous Balanced Mode
ADM	Asynchronous Disconnect Mode
ASE	Application Service Element
BER	Bit Error Rate
CCITT	The International Telegraph and Telephone Consultative Committee
CL	Connectionless
CLNS	Connectionless Network Service
CLTS	Connectionless Transport Service
CO	Connection-oriented (or Connection Mode)
CONS	Connection-oriented Network Service
COTS	Connection-oriented Transport Service
CR	Connection Request
DCE	Data Circuit-Terminating Equipment
DCPS	Data Communications Protocol Standards
DDN	Defense Data Network
DIS	Draft International Standard
DISA	Defense Information Systems Agency
DISC	Disconnect
DL	Data Link
DM	Disconnect Mode
DOD	Department of Defense
DODISS	DOD Index of Specifications and Standard s
DSP	DOD Standardized Profile
DTE	Data Terminal Equipment
DTMP	DCPS Technical Management Panel
EIA	Electronics Industries Association
ER	Error Report
ES	End System
ES-ES	End System-to-End System
ES-IS	End System-to-Intermediate System
FCC	Flow Control Confirmation
FCS	Frame Check Sequence
FEC	Forward Error Correction
FIPS	Federal Information Processing Standard
FRMR	Frame Reject
FSC	Federal Supply Classification
GNMP	Government Network Management Profile
GOSIP	Government Open Systems Interconnection Profile
IEC	International Electrotechnical Commission
IGOSS	Industry/Government Open Systems Specification
Interm.	Intermediate
IPRL	ISPICS Requirements List
IS	International Standard; Intermediate System
ISO	International Organization for Standardization; International Standards Organization
ISO-TR	ISO Technical Report
ISP	International Standardized Profile
ISPICS	ISP Information Conformance Statement
IT	Information Technology
ITU	Inter-Telecommunication Union

JIEO	Joint Interoperability and Engineering Organization
Kbps	Kilo bits per second
Mbps	Mega bits per second
MIL-HDBK	Military Handbook
MIL-STD	Military Standard
(n)	A number to be completed; one of many parts; a particular part of a multi-part series
NCMS	Network Connection Management Subprotocol
NDM	Normal Disconnect Mode
NIMP	NATO Interoperability Management Plan
NIST	National Institute of Standards and Technology
NIST-SP	NIST Special Publication
NITF	National Imagery Transmission Format
NITFS	NITF Standard
NLSP	Network Layer Security Protocol
NPDU	Network Protocol Data Unit
NS	Network Service
NSAP	Network Service Access Point
NSDU	Network Service Data Unit
OSE	Open Systems Environment
OSI	Open Systems Interconnection
PDAM	Proposed Draft Amendment (ISO)
PDU	Protocol Data Unit
PICS	Protocol Implementation Conformance Statement
QOS	Quality of Service
RD	Request Disconnect
REJ	Reject
RIM	Request Initialization Mode
RNR	Receive Not Ready
ROA	Request of Acknowledgement Mark
RR	Receiver Ready
RSET	Reset
SABM	Set Asynchronous Balanced Mode
SABME	Set Asynchronous Balanced Mode Extended
SATCOM	Satellite Communication
SD-1	Standardization Directory 1
SIA	Stable Implementors' Agreement
SIM	Set Initialization Mode
SN	SubNetwork
SNDCF	Subnetwork Dependent Convergence Function
SREJ	Selective Reject
STANAG	NATO Standardization Agreement
TAnnnn	Subnetwork Independent COTS over CLNS Profile
TC	Transport Connection
TCS	Trusted Communication Sublayer
TIS	Technical Interface Specification
TLSP	Transport Layer Security Protocol
TP4	Transport Protocol Class 4
TPDU	Transport Protocol Data Unit
TS	Transport Service
TSAP	Transport Service Access Point
UA	Unnumbered Acknowledgement Frame
UAnnnn	Subnetwork Independent CLTS over CLNS Profile

5 Requirements

5.1 General Requirements and Recommendations

Part of this DSP is based on ISO/IEC International Standardized Profile (ISP) 10608-1:1992. The DSP additions to the ISP are detailed in this section. These additions include support of DOD specific requirements and the specifications set forth in the Stable Implementors' Agreements (SIA) and FIPS 146-1 (GOSIP).

A conforming implementation to this part of MIL-STD-2045-14500 shall satisfy:

- All requirements in the remainder of this section 5
- All mandatory requirements of the base standards referenc ed by this DSP
- All the constraints specified in Annex A (normative), DPRL.

5.2 Transport Layer Conformance Requirements

A conforming implementation of this part of MIL-STD-2045-14500 shall satisfy the conformance requirements of ISO 8073 and support the mandatory features for Transport Protocol class 4 (TP4) listed in the base standard DSPICS and the referenced PICS proforma.

5.2.1 Static Conformance Requirements

5.2.1.1 The capability of request acknowledgement shall be supported. The use of this capability is optional.

5.2.1.2 The capability of selective acknowledgement shall be supported. The use of this capability is optional.

5.2.1.3 ES procurers shall mandate implementation of the priority parameter. Implementations shall send an explicit priority parameter.

5.2.2 Dynamic Conformance Requirements

5.2.2.1 When the maximum number of Transport connection conditions are encountered, a disconnect request TPDU shall be a response to a connection request TPDU. However, the transport service provider shall not refuse a new transport connection with proposed priorities 0, 1, and 2 provided at least one of the existing connections has a priority lower than the proposed priority of the new connection. The Transport service provider may need to clear sufficient resources, possibly by disconnecting one or more existing transport connections beginning with the lowest priority connection. Any new transport connections with priorities less than 2 will not preempt existing connections. The following nonstandard reason values are defined for use at Transport connection release when affected by the preemption:

- value 128+20 meaning: refusal for insufficient priority
- value 128+21 meaning: preemption by TS provider
- value 128+22 meaning: insufficient Quality of Service (QOS)

Use of these non-standard reason values in the DR TPDU when using the priority parameter is optional. These values should not be generated when the Connection Request (CR) TPDU that created the connection did not contain the priority parameter. Other reason values are not affected by these preemption values.

5.2.2.2 Known parameters with valid lengths but with invalid parameter values in a CR TPDU shall be handled as follows:

Parameter	Action
TPDU Size	Ignore Parameter, Use Default
Version	Ignore Parameter, Use Default
Alternative Protocol Class	Protocol Error
TSAP id	Send DR TPDU
Checksum	Discard CR TPDU

5.2.2.3 DR TPDUs shall carry a reason code that explains the actual cause of the disconnect. A DR TPDU may carry a reason code of value "0" (unspecified) if an appropriate reason code is not defined for a particular event.

5.2.2.4 The maximum amount of time by which a single AK TPDU may be delayed should be indicated to the peer Transport service provider using the acknowledgement time parameter. The transmitted value of the acknowledgment time parameter should be expressed in units of milliseconds and rounded to the nearest whole millisecond.

5.2.2.5 Unrecognized or not applicable bits of the Additional Options parameter shall be treated as a protocol error. Use of the Additional Options parameter is invoked to deselect the use of the checksum, request acknowledgement, invoke selective acknowledgement, and to make use of Expedited Data.

5.2.2.6 If present, the TSAP ID field in the CR and CC TPDUs shall be encoded as a variable length field and will be interpreted as an octet string. The length of the string shall not exceed 32 octets.

5.2.2.7 If "request acknowledgement" is implemented, the implementation shall:

(a) Request use of request acknowledgements in the CR TPDU;
(b) Accept the use of request acknowledgements in the CC TPDU if it was proposed in the CR TPDU.

5.2.2.8 It is recommended that implementations send the TPDU size and the preferred maximum TPDU size parameters in the CR TPDU. The maximum TPDU size that can be negotiated is 8192 octets. This size automatically includes all lesser permitted sizes.

5.2.2.9 Inactivity Timer values should be exchanged when the connection is established. This may be mandatory in the future. If the "exchange of inactivity timers" capability is supported, the imple mentation shall send its minimum inactivity timer in the CR TPDU. If a CR TPDU is received with this time value and the capability is supported, the responding CC TPDU shall contain the inactivity time. If the inactivity time is received and the capability is supported, the following shall be used as an upper bound for W, window time:

$$I_R/N \geq W,\ N \geq 2$$

Where: I_R is the Remote Inactivity Time
N is the maximum number of transmissions

The Transport Class 4 protocol detects a failed connection by use of an "Inactivity Timer." This timer is reset each time a TPDU is received on a connection. If the timer expires, the connection is terminated. However, if the connection is desired to remain in "idle," then the connection can be maintained in a "keep alive" status by periodically transmitting an AK TPDU upon expiration of the "window timer." To realize this "keep alive" function in a simple implementation, the interval of one Transport entity's window timer must be less than that of its peer's Inactivity Timer, and vice versa. The keep-alive may be realized as follows:

Clause 12.2.3.9.a of ISO 8073 requires that ALL implementations MUST respond to the receipt of a duplicate AK TPDU not containing Flow Control Confirmation (FCC) by transmitting an AK TPDU containing the FCC parameter. Similarly, implementations MUST ALWAYS transmit duplicate AK TPDUs without FCC on expiration of the local window timer (ISO 8073, Clause 12.2.3.8.1). Receipt of this TPDU by the remote Transport entity will cause it to respond with an AK TPDU containing the FCC parameter. When this is received by the local Transport entity, it will reset its inactivity timer.

Two conditions must be met: 1) The window timer must be greater than the round trip-delay, and 2) the inactivity timer must be greater than two times the window timer and should normally be even greater if the Transport connection is to be resilient to the possible loss of an AK TPDU. It is a local matter for implementations to set the appropriate relative timer values. Paragraph 5.1.2.4 of the SIA (Dec 1992) Part 4 (Transport) pertains.

5.2.2.10 QOS shall be supported, but negotiation of the "throughput," "residual error rate," and "transit delay" parameters and protection negotiation are declared out of scope due to the wide range of delays, bit error rates (BER), and signalling rates expected on military channels. The information realized through these parameters is not considered sufficient to warrant their invocation. QOS does not assist in getting the message delivered; it only

measures (and possibly invokes) factors affecting delivery. These factors can be handled explicitly via other parameters. Receipt of the parameters "throughput," "residual error rate," "transit delay," and "protection" in the CR and CC TPDUs shall be ignored.

5.2.2.11 According to the SIAs, the sending of user data in CC, CR, or DR TPDUs is not recommended. However, if such data is sent, the disposition of any user data received in a CR TPDU, CC TPDU, or DR TPDU depends on the implementation. There are potential military applications, such as exchanging user data (e.g., password) in the CR/CC TPDUs that would provide rudimentary origin verification for the connection establishment.

5.2.2.12 A Transport entity shall accept a DR TPDU and a corresponding DC TPDU with or without a checksum in response to a CR or CC TPDU.

5.2.2.13 Priority Parameter Usage

5.2.2.13.1 A local mechanism shall be provided to convey priority information to the Transport service during CR. When appropriate, simultaneous Transport service requests can be managed on a priority basis within the Transport Layer.

5.2.2.13.2 Mapping to and from the Transport service priority value is done by encoding or decoding an integer in the range 0..14. When received, other values are invalid and should be assigned to the value 14, the lowest priority. When the priority parameter is not present in a CR TPDU, the resulting transport connection will have the lowest priority.

The priority value is negotiable, with an implicit minimum acceptable value of 14, the lowest priority. The priority parameter cannot be transmitted in a CC TPDU unless the corresponding received CR TPDU contained the priority parameter.

5.2.2.13.3 Each N-UNITDATA request shall be assigned a priority level derived from the Transport Connection (T-Conn) priority level. In event of concatenation of TPDUs, the priority assigned will be the highest of those assigned to the TPDUs as mapped in 5.2.2.13.

5.2.2.13.4 The mapping of T-Conn priority values, as determined at connection setup, to N-UNITDATA request priority values, used during data transfer, is as follows:

	T-Conn Priority	N-UNITDATA Request Priority
Highest Priority	0	14
	1	13
	2	12
	.	.
	.	.
	13	1
Lowest Priority	14	0

NOTE - This encoding is consistent with ISO 8073 and reflects the reverse encoding of ISO 8473.

5.2.2.13.5 Priority parameters are exchanged by transport entities as described below:

(a) The priority value indicated in the T-Connect Request primitive shall be encoded and sent in the CR TPDU as the priority level "desired" for the Transport connection.

(b) A receiving Transport entity supporting priority management either shall accept the priority level proposed in the CR TPDU or select a lower level. The CR shall not be rejected solely because of the "desired" priority level. The selected priority level shall be encoded and returned to the calling Transport entity in the CC TPDU. The T-Conn

priority also is passed to the local session entity with the T-Connect indication primitive and eventually is conveyed to the Application Service Element, which can reject the association if the priority is unacceptable. If a transport entity that supports priority management receives a CR TPDU without the priority parameter, the entity shall proceed as follows:

(1) It shall associate the lowest priority level with any resulting Transport connection for the purpose of local Transport connection management;

(2) It shall omit the priority parameter from any resulting CC TPDU;

(3) It shall not associate any priority information with NSDUs passed to the Network entity supporting any resulting Transport connection.

(c) A receiving Transport entity not supporting priority management shall ignore the priority parameter in the CR TPDU.

(d) If the priority parameter does not appear in the CC TPDU, the initiating Transport entity shall assume that the remote Transport entity does not support priority and, therefore, will maintain the priority sent in the CR TPDU for its local operation.

NOTE - ISO 8073 does not specify a negotiation mechanism at this time; this process will allow a priority level to be established for a TC.

5.2.2.14 All implementations shall request "use of extended formats" in the CR TPDU. Implementations shall accept the "use of extended formats" in the CC TPDU if it was proposed in the CR TPDU. Implementations shall accept "use of normal formats" if it was proposed in the CR TPDU.

5.2.2.15 Implementations shall be capable of proposing and accepting the non-use of checksums.

5.3 Network Layer Conformance Requirements

A conforming implementation to this part of MIL-STD-2045-14500 shall satisfy the subnetwork indepen dent conformance requirements and the subnetwork dependent conformance requirements of ISO 8473.

5.3.1 Static Conformance Requirements

Change to the static conformance requirements for the connectionless network services are reflected in footnotes contained in the PICS.

5.3.2 Dynamic Conformance Requirements

5.3.2.1 Complete route recording is a network layer function that is useful for diagnosing network problems and also is a desirable security feature. However, under certain conditions, use of this function may result in loss of PDUs. Therefore, a local mechanism for enabling or disabling this function by network management shall be provided.

5.3.2.2 Changes in the dynamic conformance requirements will be reflected in footnotes pertinent to the function as appearing in the PICS.

5.4 Data Link Layer Conformance Requirements

The Data Link Layer conformance requirements are defined in MIL-STD-2045-14500 parts 2 through (n).

5.5 Physical Layer Conformance Requirements

The Physical Layer conformance requirements are defined in MIL-STD-2045-14500 parts 2 through (n).

ANNEX A

(normative)

DSPICS REQUIREMENTS LIST (DPRL)

A.1 Introduction

This document provides the DSPICS Requirements List (DPRL) for implementations of the DOD Standardized Profile (DSP) MIL-STD-2045-14500. The DSPICS for an implementation is generated by completing the DPRL in accordance with the instructions given below.

The DPRL is based on ISO DIS 8073:1991, ISO 8473:1988/PDAM4:1991, and on the IPRL in Annex A of ISP 10608-1:1992. Only those indexes that make profile selections differently from those in the IPRL or those that refer to amplifying information in the Requirements clause (5) are listed. The DPRL has additional indexes (see A.3.2.4) where requirements are not addressed by the IPRL or base standards. This DPRL must be used in conjunction with the IPRL when completing the base standard PICS proforma provided in Annexes C and D of ISO 8073 and as provided in the base standards. The proforma in this document are based on those accompanying the referenced base standards.

An implementation shall satisfy the mandatory conformance requirements of the base standards referenced in this profile.

An implementation's completed DPRL is called the DSPICS. The DSPICS states which capabilities and options of the protocol have been implemented. The following can use the DSPICS:

(a) the protocol implementor, as a checklist to reduce the risk of failure to conform to the standard through oversight.

(b) the supplier and acquirer or potential acquirer of the implementation, as a detailed indication of the capabilities of the implementation, stated relative to the common basis for understanding provided by the standard DSPICS proforma.

(c) the user or potential user of the implementation, as a basis for initially checking the possibility of inter-working with another implementation (note that, while inter-working can never be guaranteed, failure to internetwork can often be predicted from incompatible DSPICSs).

(d) a protocol tester, as the basis for selecting appropriate tests against which to assess the claim for conformance of the implementation.

A.1.1 Notation

The following notations and symbols from MIL-HDBK-829, which references ISO/IEC TR 10000-1 and -2, are used in the DPRL to indicate the status of features:

Status Symbols

m	-	mandatory
m.<n>	-	support of every item of the group labeled by the same numeral <n > required, but only one is active at a time
o	-	optional
o.<n>	-	optional, but support of at least one of the group of options labeled by the same numeral <n> is required
c	-	conditional
-	-	non-applicable (i.e., logically impossible in the scope of the profile)

x	-	excluded or prohibited
i	-	out of scope of profile (left as an implementation choice)

In addition, the symbol "•" is used to indicate an option whose status is not constrained by the profile (status in the base standard). The o.<n> notation is used to show a set of selectable options (i.e., one or more of the set must be implemented) with the same identifier <n>.

Two character combinations may be used for dynamic conformance requirements. In this case, the first character refers to the static (implementation) status, and the second refers to the dynamic (use); thus "mo" means "mandatory to be implemented, optional to be used."

Notations for Conditional Status

The following predicate notations are used:

<predicate>:: This notation introduces a group of items, all of which are conditional on <predicate>.

<predicate>: This notation introduces a single item which is conditional on <predicate>.

In each case, the predicate may identify a profile feature, or a Boolean combination of predicates. ("^" is the symbol for logical negation.)

<index>: This predicate symbol means that the status following it applies only when the DPICS states that the features identified by the index are supported. In the simplest case, <index> is the identifying tag of a single DPICS item. The symbol <index> also may be a Boolean expression composed of several indexes.

<index>:: When this group predicate is true, the associated clause should be completed.

Notations used in the Protocol Feature Column

<r>	Symbol used to denote the receiving system.
<t>	Symbol used to denote the transmitting system.

Support Column Symbols

The support of every item as claimed by the implementor is stated by circling the appropriate answer (Yes, No, or N/A) in the support column:

Yes	Supported by the implementation.
No	Not supported by the implementation.
N/A	Not applicable.

Base standard requirements are shown using the equivalent notations in upper case (e.g., M, O, X).

A.1.2 Static Support

Mandatory: The element or feature shall be fully supported. An implementation shall be able to generate the element and/or receive the element and perform all associated relevant procedures as defined in the base standards. Where support for origination and reception are not distinguished (such as in a footnote, etc.), then both capabilities must be assumed.

Optional: An implementation is not required to support the element or feature. If support is claimed, the element shall be treated as if it were specified as mandatory support. If support for origination is not claimed, then the element is not generated. If support for reception is not claimed, the element is ignored.

Conditional: The element or feature shall be supported under the conditions specified in this DSP. If these conditions are met, the element shall be treated as if it were specified as mandatory support. If these conditions are not met, the element shall be treated as if it were specified as optionally supported, unless otherwise stated.

Out of Scope: The element is outside the scope of this part of the DSP.

Not Applicable: The element is not applicable in the particular context in which this classification is used.

A.1.3 Dynamic Support

Mandatory: The element shall always be present. An implementation shall ensure that the element is always generated or otherwise used, as appropriate.

Excluded: The element shall never be present. An implementation shall ensure that the element is never generated or otherwise used, as appropriate.

When the profile requirement is expressed as a two-character combination (as defined in A.1.1 above), then the response shall address each element of the requirement; e.g., for the requirement "mo," the possible compliant responses are "yy" or "yn."

A.1.4 Footnotes

Footnotes to the proforma are indicated by superscript numerals. The footnote appears on the page of the first occurrence of the numeral. Subsequent occurrences of a numeral refer to the footnote of the first occurrence.

A.1.5 Instructions for Completing the DPRL

A DSP implementor shows the extent of compliance to a DSP by completing the DPRL; that is, compliance to all mandatory requirements and the options that are not supported are shown. The resulting completed DPRL is called a DSPICS. Where this profile refines the features of the base standards, the requirements expressed in this DPRL shall be applied (as indicated in DPRL items with no "Profile Support" column) to constrain the allowable responses in the base standard DPICS proforma. When this profile makes additional requirements, the "Profile Support" column for such DPRLs shall be completed. In this column, each response shall be selected either from the indicated set of responses, or it shall comprise one or more parameter values as requested. If a conditional requirement is inapplicable, use the Not Applicable (NA) choice. If a mandatory requirement is not satisfied, exception information must be supplied by entering a reference Xi, where i is a unique identifier, to an accompanying rationale for the noncompliance. When the profile requirement is expressed as a two-character combination (as defined in A.1.1 above), the response shall address each element of the requirement; e.g., for the requirement "mo," the possible compliant responses are "yy" or "yn."

A.2 Standards Referenced

This profile specifies the provision of the connection-mode Transport service, class 4, in an End System (ES) from which a standardized connectionless-mode network service operating over digital data circuits is available (or can be made available). It uses the following standards:

ISO 8073	Transport Layer Protocol
ISO 8473	Network Layer Protocol

A.3 DSPICS Requirements List

A.3.1 General Information

A.3.1.1 Implementation Identification

Supplier	
Contact point for queries about the profile	

Implementation name(s) and version(s)	
Date of statement	
Other information: machine name, operating system, system name	

A.3.1.2 Protocols

Item	Feature	Base Std	Reference	Status	Profile features		Support
					Clause	Status	
TP	Transport Protocol class 4	ISO 8073	1.3	M	5.2	m	Yes
NP	Connectionless-mode Network protocol	ISO 8473	1.3	M	5.3	m	Yes

A.3.2 Transport Layer DPRL

The Transport Layer DPRL **must be used with the base standard PICS** included in Annex C of the base standard, since only those items refined in the profile are included in this DPRL. Each of the following tables is cross-referenced to the base standard PICS (ISO DIS 8073, Annex D:1991-10) to assist the user.

A.3.2.1 Network Connection Management Subprotocol (NCMS)

Item	Feature	Base Standard		Profile		Support
		Reference	Status	Clause	Status	
A1	Support of NCMS function	Annex B	O		Ä	No

A.3.2.2 Classes Implemented (C.6.2 PICS)

Item	Feature	Base Standard		Profile		Support
		Reference	Status	Clause	Status	
C0	Class 0	14	O.1		i[1]	No
C1	Class 1	14	CO:O		CO:i	No
C2	Class 2	14	O.1		i[1]	No
C3	Class 3	14	C2:O		C2:i	No
C4	Class 4 operation over CONS	14	C2:O		C2:i	No
C4L	Class 4 operation over CLNS	14	C2:O	1.3	C2:m	Yes

A.3.2.3 Initiator/Responder Capability (C.8 PICS)

Item	Feature	Base Standard		Profile		Support
		Reference	Status	Clause	Status	
IR1	Initiating CR TPDU	14.5 a)	O.2		m	Yes
IR2	Responding to CR TPDU	14.5 a)	O.2		m	Yes

A.3.2.4 DOD Military Enhancements

Item	Feature	Base Standard		Profile		Support
		Reference	Status	Clause	Status	
T4F99	Support of precedence and preemption in class 4		O	5.2.2.13	o	Yes No
T4F99a	Priority negotiation			5.2.2.13.5	T4F99:m	N/A Yes
T4F99r	Connection refusal with reason 128+20		T4F99:O	5.2.2.1	T4F99:o	Yes No
T4F99p	Connection preemption with reason 128+21		T4F99:O	5.2.2.1	T4F99:o	Yes No
T4F99q	Connection release with reason 128+22		T4F99:M	5.2.2.1	T4F99:m	NA Yes

Note 1: The base standard identifies class 0 or 2 as alternatives to class 4 operation. As shown in the table dependencies above, these classes are not permitted when operating with CLNS. The base standard explicitly specifies Transport Class 4 will be used over CLNS.

A.3.2.5 Supported Functions for Class 4 over CLNS (C.9.5 PICS)

Item	Feature	Base Standard		Profile features		Support
		Reference	Status	Clause	Status	
T4F28	Data TPDU numbering (extended)	6.10	O		mo[1]	
T4F29	Non-use of checksum	6.17	O		mo	

Note 2: ISO/IEC ISP 10608-1, Annex D, clause D.14 strongly recommends support of this function to obtain adequate performance from high speed networks and high volume data transfer (e.g., NITF environment.) Therefore, support of this function is mandatory in this DPRL.

A.3.2.6 Supported TPDUs (C.10 PICS)

Item	Feature	Base Standard		Profile		Support
		Reference	Status	Clause	Status	
ST5a	Transmission of DR TPDUs with reason code	13.1	IR2:M	5.2.2.3	mm	yes
ST6	Receipt of DR TPDU with or w/o checksum	13.1	IR1:M	5.2.2.12	mm	yes
ST8	Receipt of DC TPDU with or w/o checksum	13.1	M	5.2.2.12	mm	yes

A.3.2.7 Supported Parameters in Issued CR TPDUs (C.11 PICS)

Item	Feature	Base Standard		Profile		Support
		Reference	Status	Clause	Status	
ICR2	Is Class 0 always offered as an alternative class	14.4	O		oi[1]	
I4CR7	Called TSAP ID	13.3.4 a)	O	5.2.2.6	mo	
I4CR8	Calling TSAP ID	13.3.4 a)	O	5.2.2.6	mo	
I4CR9	TPDU size	13.3.4 b)	O	5.2.2.8	mo	
I4CR10	Version number	13.3.4 d)	O		oi[1]	
I4CR11	Protection parameters	13.3.4 e)	O	5.2.2.10	oi[1]	
I4CR12	Additional option selection	13.3.4 g)	O	5.2.2.5	mo[1]	
I4CR13	Throughput	13.3.4 k)	O	5.2.2.10	oi	
I4CR14	Residual error rate	13.3.4 m)	O	5.2.2.10	oi	
I4CR15	Priority	13.3.4 n)	O	5.2.1.3 5.2.2.1 5.2.2.13	mm	
I4CR16	Transit delay	13.3.4 p)	O	5.2.2.10	oi	
I4CR17	Acknowledge time	13.3.4 j)	O	5.2.2.4	mo	
I4CR18	Preferred maximum TPDU size	13.3.4 c)	O	5.2.2.8	mo	

Note 3: Since this DPRL addresses COTS Class 4 over CLNS, any other transport classes are not permitted. Class "0" is out of scope.

Note 4: ISO/IEC ISP 10608-1, Annex D, clause D.1.3 states that "The version number parameter should never be transmitted in the CR TPDU or will be ignored if it is received. If for some reason the version number is to be transmitted in the CR TPDU, its value should be set to one." Therefore, use of this parameter is out of scope in this DPRL.

Note 5: The Protection parameter is for future study.

Note 6: Use or non-use of checksums, expedited data, request acknowledgements, and selective acknowledgements is indicated in the additional option selection parameter of CR and CC TPDUs. If use of any of these features is mandatory, then use of the additional options parameter becomes mandatory.

Item	Feature	Base Standard		Profile		Support
I4CR19	Inactivity time	13.3.4 r)	O	5.2.2.9	mo	

A.3.2.8 Supported Parameters in Issued CC TPDUs (C.11 PICS)

Item	Feature	Base Standard		Profile		Support
		Reference	Status	Clause	Status	
I4CC6	Called TSAP ID	13.4.4	O	5.2.2.6	mo	
I4CC7	Calling TSAP ID	13.4.4	O	5.2.2.6	mo	
I4CC8	TPDU size	13.4.4	O	5.2.2.8	mo	
I4CC9	Protection parameters	13.4.4	O	5.2.2.10	oi[6]	
I4CC10	Additional option selection	13.4.4	O	5.2.2.5	mo	
I4CC11	Acknowledge time	13.4.4	O	5.2.2.4	mo	
I4CC12	Throughput	13.4.4	O	5.2.2.10	oi	
I4CC13	Residual error rate	13.4.4	O	5.2.2.10	oi	
I4CC14	Priority	13.4.4	O	5.2.2.13	mm	
I4CC15	Transit delay	13.4.4	O	5.2.2.10	oi	
I4CC16	Preferred maximum TPDU size	13.4.4	O	5.2.2.8	mo	
I4CC17	Inactivity time	13.4.4	O	5.2.2.9	mo	

A.3.2.9 Supported Parameter in Issued DR TPDUs (C.11 PICS)

Item	Feature	Base Standard		Profile		Support
		Reference	Status	Clause	Status	
I4DR4	Additional information	13.5.4 a)	O	5.2.2.11	oo	

A.3.2.10 User Data in Issued TPDUs (C.13 PICS)

Item	Feature	Base Standard		Profile		Support
		Reference	Status	Clause	Status	
D4ICR	Up to 32 octets in a CR TPDU	13.3.5	O	5.2.2.11	mo[1]	
D4ICC	Up to 32 octets in a CC TPDU	13.4.5	O	5.2.2.11	mo[7]	
D4IDR	Up to 64 octets in a DR TPDU	13.5.5	O	5.2.2.11	mo[7]	

A.3.2.11 Negotiation (C.15 PICS)

Item	Feature	Base Standard		Profile		Support
		Reference	Status	Clause	Status	
Format proposed in CR TPDU?						
NEF3a	normal	6.5.4n)	O.1		m	Yes
NEF3b	extended	6.5.5n)	O.1		m	Yes
Format in CC TPDU when extended proposed in CR TPDU?						
NEF6a	normal	6.5.4n)	O.2		m	Yes
NEF6b	extended	6.5.5n)	O.2		m	Yes
Checksum proposal in CR TPDU?						
NUC1a	non-use	6.5.4p)	O.3		m	Yes
NUC1b	use	6.5.5p)	O.3		m	Yes
Checksum in CC TPDU when non-use proposed in CR TPDU?						
NUC2a	non-use	6.5.4p)	O.4		m	Yes
NUC2b	use	6.5.5p)	O.4		m	Yes
USA1	Is use of selective acknowledgement proposed in CR TPDUs	6.5.5	O	5.2.1.2	mo	
USA2	Is use of selective acknowledgement selected in CC when proposed in CR TPDU	6.5.5	O	5.2.1.2	mo	
ROA1	Use of request acknowledgements proposed in CR TPDU	6.5.5	O	5.2.1.1 5.2.2.7	mo	
ROA2	Use of request acknowledgements in CC TPDU when proposed in CR TPDU	6.5.5	O	5.2.1.1 5.2.2.7	mo	

Note 7: Although the Stable Implementors' Agreements (SIA) do not recommend sending user data, there is no reason given. Its potential military applications are for further study. Implementation is optional.

A.3.2.12 Error Handling (C.16 PICS)

Item	Feature	Base Standard		Profile		Support
		Reference	Status	Clause	Status	
PE4L	Action on receipt of protocol error	6.22.2	ER, DR, Discard		state action	
RR7	Action on receipt of a valid parameter with an invalid value in a CR TPDU	13.2.3	Ignore or Protocol Error	5.2.2.2	m m	Yes Yes

A.3.3 Network Layer DPRL

The Network layer DPRL **must be used with the PICS proforma for the base standard** (ISO 8473:1988/PDAM4:1991), since only those features refined in the profile are included.

A.3.3.1 Major Capabilities (D.5 PICS)

Item	Feature	Base Standard		Profile		Support
		Reference	Status	Clause	Status	
ES	End System		O.1		mm	Yes
IS	Intermediate		O.1		oi	
NSS-s	Non-segmenting Subset	I5.2	ES:O		ES:ox[1]	
IAS-s	Inactive Subset	15.2	ES:O		ES:ox[1]	
S802	SNDCF for ISO 8802	8.4.2	ES:O.2		ES:oi	
SCLL	SNDCF for CL Link Service	8.4.4.1	ES:O.2		ES:oi	
SCOL	SNDCF for CO Link Service	8.4.4.2	ES:O.2		mm	Yes
SX25	SNDCF for ISO 8208	8.4.3	ES:O.2		ES:oi	

Note 8: In accordance with the NIST Stable Implementor's Agreements, implementations will NOT transmit PDUs encoded using the Inactive subset. Received PDUs encoded using the Inactive Subset will be discarded. The non-segmenting subset will NOT be used. Implementations WILL generate data PDUs with a segmentation part. However, implementations will receive and correctly process PDUs which do not contain the segmentation part.

A.3.3.2 Supported Functions (D.6.2 PICS)

Item[1]	Feature	Base Standard		Profile		Support
		Reference	Status	Clause	Status	
eSecu-s	<s> Security	6.13	O		o[1]	
eSecu-r	<r> Security	6.13	O		o[3]	
eCRR-s	<s> Complete Route Recording	6.15	O	5.3.2.1	oo[1]	
eCRR-r	<r> Complete Route Recording	6.15	O	5.3.2.1	oo[4]	
ePRR-s	<s> Partial Route Recording	6.15	O		mo[1]	
ePRR-r	<r> Partial Route Recording	6.15	O		mo[5]	
eCSR	Complete Source Routing	6.14	O		ox[1]	
ePSR	Partial Source Routing	6.14	O		ox[5]	
eQOSM-s	<s> QOS Maintenance	6.16	O		eCong-s:mm	
eQOSM-r	<r> QOS Maintenance	6.16	O		eCong-r:mm	
eCong-s	<s> Congestion Notification	6.18	O		mo[1]	
eCong-r	<r> Congestion Notification	6.18	O		mo[6]	

Note 1: Prefix "e" signifies End System.

Note 9: FIPS 146-1 (GOSIP V.2) provides the details of the generic security feature. The Network Layer Security Protocol (NLSP) and the Transport Layer Security Protocol (TLSP) are alternatives that may be considered for use in military systems implementations. This is an operational decision and is out of scope for this profile. Either should be satisfactory from a technical aspect. There are also other security implementations possible that would be technically acceptable, but are also out of the scope of this DSP.

Note 10: Complete route recording will result in an intermediate system discarding all the derived PDUs associated with the initial PDU when there is a discrepancy in the recorded route during IS assembly time. This function and partial route recording are useful for diagnosing network problems. These functions also may be a desirable security feature.

Note 11: Partial route recording will not cause any PDUs to be discarded, but if an IS reassembles an initial PDU from the derived PDUs, it may choose to select any of the routes recorded in derived PDUs for the initial PDU.

Note 12: In accord with the SIA, Partial and Complete Source Routing will not be supported.

Note 13: An Intermediate System will start discarding PDUs when it encounters a congestion condition. The mechanism it uses to indicate this action is to set the congestion experienced (C/E) flag. Since this mechanism provides immediate notification that data is being lost, it is to be supported. However, use is optional, since loss of data may be prevented by other means (e.g., the error recovery mechanisms of TP4).

A.3.3.3 Supported Parameters (DT NPDU) (D.6.4.1 PICS)

Item	Feature	Base Standard		Profile		Support
		Reference	Status	Clause	Status	
edCRR-s	<s> Complete Route Recording	7.55	eCRR-s:M		eCRR-s:mo	
edCRR-r	<r> Complete Route Recording	7.5.5	eCRR-r:M		eCRR-r:mo	
edPRR-s	<s> Partial Route Recording	7.55	ePRR-s:M		ePRR-s:mo	
edPRR-r	<r> Partial Route Recording	7.5.5	ePRR-r:M		ePRR-r:mo	
edQOSM-s	<s> QOS Maintenance	7.5.6	C1:M		C1:mm	
edQOSM-r	<r> QOS Maintenance	7.5.6	C2:M		C2:mm	

C1:eQOSM-s OR eCong-s
C2:eQOSM-r OR eCong-r

A.3.3.4 Supported Parameters (ER NPDU) (D.6.4.2 PICS)

Item	Feature	Base Standard		Profile		Support
		Reference	Status	Clause	Status	
eeCRR-s	<s> Complete Route Recording	7.5.5	eCRR-s:M		eCRR-s:mo	
eeCRR-r	<r> Complete Route Recording	7.5.5	eCRR-r:M		eCRR-r:mo	
eePRR-s	<s> Partial Route Recording	7.5.5	ePRR-s:M		ePRR-s:mo	
eePRR-r	<r> Partial Route Recording	7.5.5	ePRR-r:M		ePRR-r:mo	
eeQOSM-s	<s> QOS Maintenance	7.5.6	C1:M		C1:mo	
eeQOSM-r	<r> QOS Maintenance	7.5.6	C2:M		C2:mo	

ANNEX

(informative)

CONCLUDING MATERIAL

B.1 Deviations from Base Standards/Referenced Profiles

The DPRL in Annex A depicts the deviations from the base standards under the "Profile" column. This profile does not deviate from ISO conventions as contained in ISO 8073. It only calls out a set of existing options that are desirable for military communications operations.

The eight military features are identified in military data communications systems. The degree to which this DSP meets these military features is discussed in the following paragraphs.

B.1.1 Multi-Homed and Mobile Host Systems

This feature addresses the network layer routing protocols. Their ability to exchange routing dynamically is outside the scope of this profile, and the service these protocols require may not be available on all subnetworks.

B.1.2 Multi-Endpoint Connections

Support of this feature is primarily an addressing issue. The network layer can provide at least partial support of this feature. ISO is considering several proposals on transport layer multicast. However, there is no provision for the transport layer to access this network layer capability.

B.1.3 Internetworking

Internetworking is a network address definition issue. The ISO standard employed in this profile should provide adequate basis for this feature in OSI CLNP network enterprise. The internetwork routing function is provided by network layer relays (routers) or data link layer frame relays (bridges), which generally are referred to as Intermediate Systems (IS). The scope of this DSP is limited to End Systems (ES).

B.1.4 Network/Systems Management

ISO OSI-defined management functions, management protocols, and the management information base should satisfy the requirement for network and system management. The commitment of suppliers to produce ISO OSI-compliant network management systems should be sought.

When ISO has made sufficient progress in defining lower layer Managed Objects, those objects required to support MIL-STD-2045-14500 will be identified. Managed objects specific to the military possibly can be referenced in MIL-STD-2045 of the 30000 series and the Government Network Management Profile (GNMP), FIPS Pub 179.

B.1.5 Security

In environments where high assurance is required, a Trusted Communications Sub-layer (TCS) may be inserted in the Network Layer. Additional work has taken place in ISO on both the Transport Layer Security Protocol (TLSP) and the Network Layer Security Protocol (NLSP). Although these security features are not addressed in this DSP, the profile is not affected by the addition of any of these protocol sublayers.

In environments where lower assurance is required, the security function of ISO 8473 and the protection parameter of ISO 8073 may be used to convey a security label that will be meaningful within the subnetwork. Section 6 of FIPS 146-1 discusses a possible method of providing this security.

B.1.6 Robustness and Quality of Service

ISO OSI standards are expected to provide an adequate basis for this feature. The application of ISO routing protocols and network management to support robustness, the definition of QOS, and the relationship between the QOS facilities of each layer require further study in the context of this profile.

B.1.7 Precedence and Preemption

This DSP supports precedence using the Transport service priority parameter and the Network service priority parameter. Details of how the service is provided are in the main body of this DSP and in the DPRL (Annex A). The relationship between the priority parameters in each layer and the significance of the parameter values requires further study in the context of this profile.

B.1.8 Real Time and Tactical Comm unications

The speed of the services provided to TS-users depends on the subnetwork type, the quality of the communications links, and most importantly, the design and implementation of the protocol machines. Reducing protocol and processing overheads, by prior knowledge of subnetworks and transport features, can provide near real time services within specific subnetworks. The specific real time requirements depend on specific applications.

In tactical communications where the end system (ES) processing and communication links are limited in bandwidth, the simplex and half duplex operations are desirable. This DSP-TAnnnn(D) profile supports the operation over the half duplex mode circuit. The simplex operation is a one-way, unreliable, and unacknowledged communication that does not use connection establishment. The simplex operation requires a connectionless Transport Profile, DSP-UAxx(D), in which all specified protocols operate in connectionless modes. The physical layer is scenario-dependent.

B.1.9 Recommendations for Implementation

A profile implementation is a protocol machine that requires a specific set of operational parameters to function optimally in a given environment. These operational parameters will determine the efficiency limits of the protocol machine. A communication in an NITF environment generally involves transferring large quantities of data between two ES. The following is a discussion with recommendations for the TAnnnn(D) profile to operate in the NITF environment using different media.

- Transferring a large amount of data may require that the transport layer be able to send a large PDU size and to use a large transfer window to minimize protocol transfer overhead. The network layer PDU size should match that of the transport layer to avoid having the network segment the TPDU. Since the data link layer does not perform PDU segmentation, the transfer frame size is determined by the size of the network layer PDU. Therefore, the optimum TPDU will be transferred down the communication stack with only headers added at each layer for control purposes. In high error rate environments, smaller TPDU sizes are recommended. This avoids segmentation overhead and reduces the processor load for protocol processing. It also should optimize throughput, all other factors being equal.

- For long delay network characteristics, such as satellite links and fleet SATCOM, the implementation of TAnnnn(D) profile should have a transfer window that is much larger than the end-to-end round-trip delay. This keeps the transmitter busy during the acknowledgement cycle. If the window is small, the transmitter must wait for an inordinate time relative to the transmission window for the acknowledgement from the receiver. As a result, the link utilization is low because it is mostly in idle state.

- If the ES operate in a high error rate and/or low bandwidth environment, the transmitting frame size must be prudently small to avoid the time expenditures associated with large PDU retransmission. If the frame is too large, errors are much more likely to occur on a per-frame basis, and the retransmission per-frame rate will escalate. The result will be that overall network throughput is reduced. The actual frame size is engineered based on the bit error rate (BER), the protocol overhead size, and the bandwidth. The error recovery should be accomplished on a link-per-link basis instead of end-to-end to avoid wasting network resources. The use of Selective Acknowledgement of TPDUs and Selective Reject of Data Link Frames will require that sufficient buffers be allocated for processing.

- The TPDU checksum parameter is normally used to detect TPDU corruptions stemming from lower layer discards of NPDU segments. For large TDPUs, checksum computations may incur a significant amount of processing. If the TPDU is not segmented by the lower layer, the "non-use of checksum" should be selected to avoid excessive processing.

As the result of the above, it is recommended that the DSP-TAnnnn(D) implementations support the largest allowable transport layer PDU size and the extended sequence numbering scheme if the channel is relatively error-free. The transport PDU size is subject to negotiation between two peer transport entities during the connection establishment phase. The sequence number parameter is related directly to the transfer window size and is varied dynamically by the transport entities based on the congestion condition. Since the implementation is designed to the largest parameters, the resulting protocol machine will be applicable to all above described environments.

B.2 Subject Term (Key Word) Listing

Allied Communication Publication (ACP)
Connection Oriented Transport Service (COTS)
Connectionless Network Service (CLNS)
DOD Standardized Profile (DSP)
Data Communications
Data Communications Protocol Standards (DCPS)
DCPS Technical Management Panel (DTMP)
Functional Profiles
Interoperability
Network
Relay
Standards
Transport

B.3 Preparing Activity

DISA-JIEO (Project DCPS - 0008)

B.4 Reviewing Activities

Army	SC
Air Force	02, 13, 17, 29, 90
DLA	DH
DMA	MP
DIA	DI
DOT	OST
OASD	IQ, DO, MA, IR
ODISC4	AC
STRICOM	PT
NAVY	EC, CH, ND, TD, OM
USMC	MC, CG

B.5 Custodians

DISA:	DC
Army:	SC
Air Force:	90
Navy:	OM
DIA:	DI
NSA:	NS
USMC:	MC
DLA: DH	
Other:	Joint Staff/Architecture & Integration
	USSPACECOM

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4. NATURE OF CHANGE *(Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)*

5. REASON FOR RECOMMENDATION

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